**SPL1 Project Proposal Form, 2022**
**Institute of Information Technology (IIT)**
**University of Dhaka**

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| **Student's Name:** | Sampad Sikder | | |
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**Project Description:**

Implementation of a Matrix factorization technique where a matrix $X_{m\times n}$ is factorized into two matrices $A_{m\,x\,k}$ and $B_{k\,x\,n}$. Here k will be defined by user input.
The entries of matrix $A_{m\,x\,k}$ and $B_{k\,x\,n}$ are initialized using Gaussian distribution.
Using multiplicative update, we will try to converge towards the original matrix minimizing the error. The multiplicative update will update the matrices $A_{m\,x\,k}$ and $B_{k\,x\,n}$ using the formula:

$$H=H\frac{(W^TV)}{(W^TWH)} \qquad W=W\frac{(H^TV)}{(H^THW)}$$ (Multiplicative update equation)

Where the matrix V is factorized into H and W.
The error will be calculated following Frobenius norm. The resultant matrix will be an approximation of the original matrix $X_{m\times n}$ when the error is below a certain value(ε).

In this project, the following implementations are to be done:

1. Making a random number generator function using Gaussian distribution.
2. Matrix multiplications.
3. Calculating the determinant of a matrix.
4. Finding the transpose of a matrix.
5. Finding the inverse of a matrix.

**Languages or Tools to be used:** C++, Java

**Supervisor's Name:** _Dr. Mohammad Shoyaib

**Signature of the supervisor:** _____

**Date:** 06/02/2022

**Before the Midterm Presentation:**

I confirm that the progress is satisfactory and I am forwarding it for midterm presentation.

**Signature of the supervisor:**_____

**Date:**_____

**Midterm Presentation Feedback:**